9 The human sciences

'I am more interested in how a man lives than how a star dies.'
Sherwin Nuland, 1930–

'In every science man speaks only of himself.'
Oswald Spengler, 1880–1936

'We make our surroundings and then they make us.'
Winston Churchill, 1874–1965

'Life is heredity plus environment.'
Luther Burbank, 1849–1926

'If the brain were simple enough to understand, we would be too simple to understand it.' **Anon**

'The only possible conclusion the social sciences can draw is: some do, some don't.' **Ernest Rutherford, 1871–1937**

'An economist is an expert who will know tomorrow why the things he predicted yesterday did happen today.'
Laurence J. Peter, 1919–88

'It is quite possible – overwhelmingly probable, one might guess – that we will always learn more about human life and human personality from novels than from scientific psychology.' **Noam Chomsky, 1928–**

'Maybe in order to understand mankind we have to look at the word itself. MANKIND. Basically, it's made up of two separate words – "mank" and "ind". What do these words mean? It's a mystery, and that's why so is mankind.' **Jack Handy, 1949–**

'Human behaviour makes most sense when it is explained in terms of beliefs and desires, not in terms of volts and grams.'
Steven Pinker, 1954–

'In carefully controlled laboratory conditions animals do what they damned well please.' **The Harvard law of animal behaviour**

'Know then thyself, presume not God to scan / The proper study of mankind is man.' **Alexander Pope, 1688–1744**

'We need more understanding of human nature, because the only real danger that exists is man himself.' **Carl Jung, 1875–1961**

'I can calculate the motions of heavenly bodies, but not the madness of crowds.' **Sir Isaac Newton, 1642–1727**

Introduction

Since human beings have been able to reflect about themselves and their place in the scheme of things, they have been struck by their own complex and mysterious nature. The human sciences are an attempt to reduce the mystery by studying human behaviour in a systematic way. Under the heading 'human science' (or social science) are subjects such as psychology, economics, anthropology and sociology. Despite the obvious differences between these subjects, they are all based on observation and seek to discover laws and theories about human nature.

We may, however, wonder to what extent human beings can be studied in a purely scientific way. At one level we are simply animals composed of atoms and molecules. According to the theory of evolution, we have descended from the apes, with whom we share 99% of our genes. And we are made up of the same basic ingredients as all other living things – 63% hydrogen, 25.5% oxygen, 9.5% carbon, 1.5% nitrogen, and 0.5% of a few other elements.

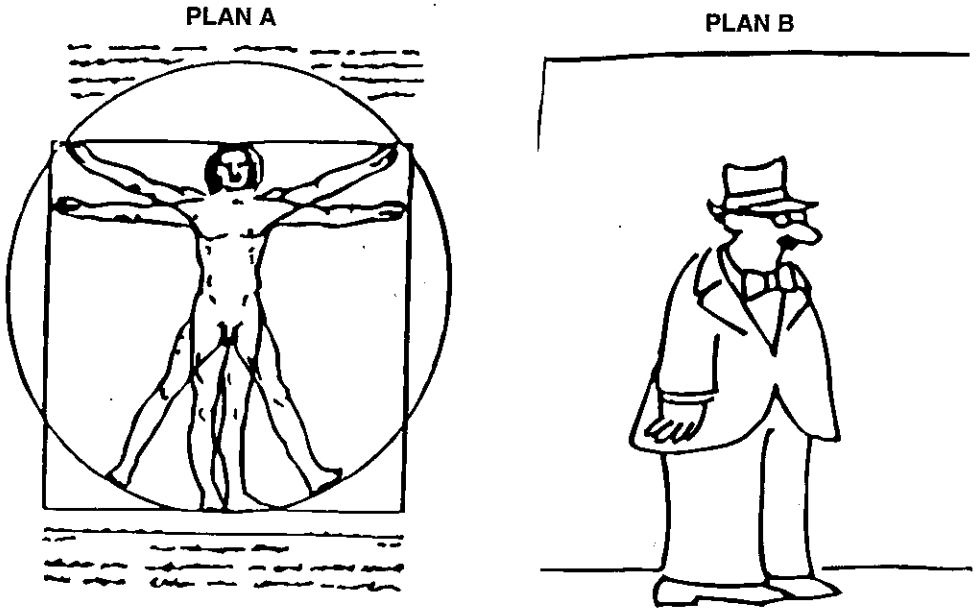

Figure 9.1

But most people would reject the idea that we are 'just animals', or 'nothing but a bunch of chemicals', and would draw attention to the differences between us and the rest of the natural world. One of our most important distinguishing characteristics – from which all others could be said to flow – is that we are *self-conscious* animals. Many other animals are conscious, but unlike us it seems that they are not aware of themselves. Some evidence for this is provided by the so-called **mirror test**. Although you recognise yourself in a mirror, a dog will bark at its own image without

ever realising that it is barking at itself. (Some chimpanzees have passed the mirror test, and this suggests that they may have the glimmerings of self-consciousness.)

Among the other features associated with self-consciousness that seem to be unique to us are **language**, **reason**, **free-will** and **creativity**. Some people also believe that we have an animating spirit or soul which cannot be explained in terms of material processes. Whatever your opinion about this, there are likely to be special challenges in studying human beings in a scientific way.

In this chapter, we will look at four key aspects of the scientific method – observation, measurement, experiments and laws – and consider what special problems arise when these steps are applied to the study of human beings. This will lead on to a more general discussion of the similarities and differences between the natural sciences and human sciences.

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1 List as many features as you can that distinguish human beings from other animals.

2 To what extent do these features make it difficult to study human beings in a scientific way?

Observation

Perhaps the most important characteristic of science is that it is based on observation. One problem in the human sciences is that, although you can observe other people's behaviour, you cannot directly observe their minds. You may be able to make an educated guess about what they are thinking, but you can never be entirely sure that you are right.

One way to find out what people think is, of course, to ask them. Since most people are reasonably honest, we can learn a lot from questionnaires, opinion polls and interviews. At the same time, since people generally want to see themselves in a good light, you cannot always take what they say at face value. There is evidence from psychology to suggest that we tend to overestimate our strengths and underestimate our weaknesses. For example, in one well-known survey of a million US high-school seniors, *all of them* ranked themselves as above average in terms of their ability to get on with other people! Since people care about what others think of them, they may also be unwilling to admit holding unpopular opinions. This may explain why extreme political parties often do better in general elections than in opinion polls.

1 Complete the following short questionnaire as honestly as possible. Then collate the results for the class as a whole. How would you interpret the results and what conclusions would you draw from them?

		Below average	Average	Above average
a	How much do you worry about what other people think of you?			
b	To what extent do you see yourself a considerate person?			
c	Do you have a good sense of humour?			
d	How open are you to new ideas?			
e	How worried are you about environmental problems?			

2 In some countries it is forbidden to publish opinion polls in the week running up to a general election. Do you think that this is a good policy, or a denial of free speech?

Loaded questions

Another problem with asking people what they think is that it is not easy to frame questions in an unbiased way. A **loaded question**, which contains a hidden assumption, may encourage people to answer one way rather than another. Consider, for example, the following 1980 US poll in which a similar question was worded in two different ways:

		In favour	Opposed
1	Do you think there should be an amendment to the Constitution prohibiting abortions, or shouldn't there be such an amendment?	29%	67%
2	Do you believe there should be an amendment to the Constitution protecting the life of the unborn child, or shouldn't there be such an amendment?	50%	34%

1 Which of the above questions do you think is loaded? Give reasons.

2 Take a controversial topic – such as abortion, or capital punishment – and try to design an unbiased questionnaire to discover people's opinions about it.

This example suggests that if you ask questions with sufficient skill and cunning, you may be able to get people to give you the answer you want. An amusing example of this can be found in an episode of the British comedy series *Yes, Prime Minister*. Two bureaucrats, Sir Humphrey Appleby and Bernard Woolley, are discussing an opinion poll which shows that 67 per cent of people are in favour of reintroducing National Service (compulsory military service). Sir Humphrey asks Bernard to commission another opinion poll which will give them the opposite result. When Bernard asks how this can be done, Sir Humphrey demonstrates how two different lines of questioning can lead a person to give a different answer to the same question.

Line One

'Mr Woolley, are you worried about the rise in crime among teenagers?'

'Yes'

'Do you think there is lack of discipline and vigorous training in our Comprehensive Schools?'

'Yes'

'Do you think young people welcome some structure and leadership in their lives?'

'Yes'

'Do they respond to a challenge?'

'Yes'

'Might you be in favour of reintroducing National Service?'

'Yes'

Line Two

'Mr Woolley, are you worried about the danger of war?'

'Yes'

'Are you unhappy about the growth of armaments?'

'Yes'

'Do you think there's a danger in giving young people guns and teaching them how to kill?'

'Yes'

'Do you think it's wrong to force people to take up arms against their will?'

'Yes'

'Would you oppose the reintroduction of National Service?'

'Yes'

A final point we can make about questionnaires is that there is often a difference between what people say they would do in a hypothetical situation and what they actually do in reality. You might, for example, say that you would be willing to buy a product at a certain price, but have second thoughts about it when you actually have to part with your money. More dramatically, you might fondly imagine that if you were trapped in a burning building, you would selflessly help other people to escape before leaving yourself. We are all heroes in our dreams, but if this happened in reality, you might be the first to run for safety!

"How would you like me to answer that question? As a member of my ethnic group, educational class, income group, or religious category?"

Figure 9.2

The observer effect

Another problem with observation in the human sciences is the so-called **observer effect**. If a geologist is studying rocks they are indifferent to his presence; but if a psychologist is observing people they may become nervous or embarrassed by his attention and this may lead them to change their behaviour.

Imagine, for example, learning that national TV are coming to your school tomorrow to film a typical Theory of Knowledge class. How would this affect your behaviour? You might dress differently, try to look interested in class, and speak with unusual eloquence. Or you might be so anxious not to make a fool of yourself that you are not able to contribute at all. Either way, the presence of the TV cameras will ensure that the class is not a typical one.

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1. What ways, if any, are there of getting round the 'observer effect'?
2. Reality TV has become popular in many countries, with series like *Big Brother*, *Survivor* and *Star Academy*. What, if anything, do we learn about human nature from such programmes?

Figure 9.3

There are at least two ways in which a human scientist can try to get round the observer effect. The first is *habituation*. If national TV came and filmed your TOK class for a whole term, you would probably get used to the presence of the cameras and eventually ignore them. Anthropologists use a similar strategy when they **go native** and live with a tribe for an extended period of time. The hope is that the people they are studying will eventually get used to them and behave normally in their presence.

Another solution to the observer effect is to use hidden cameras. If you don't know that you are being observed, then it won't affect your behaviour. But this raises ethical questions about whether or not it is acceptable to film people without their knowledge.

A variant of the observer effect concerns the way in which a prediction can affect what is predicted. A classical example of this can be found in the Greek tragedy *Oedipus Rex*. When Oedipus was born, a prophecy was made that he would kill his father and marry his mother. When his father, the king of Thebes, learned of this he was horrified and abandoned the new-born child in the mountains, hoping that he would die so that the prophecy would not come true. But Oedipus was rescued by a shepherd and eventually adopted by the king and queen of Corinth. He grew up believing that they were his real parents. Then, as a young man, he learned of the prophecy about himself and fled home in terror. On the road, he got into an argument with a stranger and killed him. He then turned up in Thebes where he eventually married the recently widowed queen. Without realising it, Oedipus had killed his father and married his mother. When at the end of the play, he discovered the truth, he was not a happy man. Sophocles' tragedy derives its power from the fact that in the very act of trying to escape the prophecy Oedipus brought it down on himself. If only he had stayed in Corinth, everything would have been fine!

The effects of predictions on human behaviour are not usually as dramatic as in *Oedipus Rex*, but they can still have serious consequences. Here are three examples taken from different human sciences.

1 Psychology

In a well-known psychology experiment, school children were randomly allocated to one of two groups labelled 'bright' and 'less bright'. Although there was no initial difference between the two groups, the children labelled 'bright' made greater academic progress in the following year than the students labelled 'less bright'. This suggests that teachers' expectations affected how well the students did and helped to produce the differences between the two groups.

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1 To what extent do you think your teachers' expectations about your abilities affect how well you do at school?

2 Would it be better if teachers had no expectations about you? To what extent is that possible?

3 Do you think that primary-school teachers should divide up children into good readers and not-so-good readers? What would be the pros and cons of doing this?

4 To what extent can your own expectations about yourself affect your academic performance?

2 Economics

If you follow the stock market, you are probably aware that people's expectations can affect share prices. In a ***bull market***, when most people expect prices to rise, a rational investor will buy stocks now, hoping to sell them later at a higher price thereby making a profit. If everyone behaves like that, the demand for stocks will increase and cause prices to rise. Conversely, in a ***bear market*** when most people expect prices to fall, a rational investor will sell stocks now, hoping to buy them back later at a lower price. But if everyone does that, the increased supply of stocks will push prices down. So if everyone expects prices to rise they will rise, and if everyone expects prices to fall they will fall.

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1 Do you think the behaviour of stock markets is governed more by reason or more by emotion?

2 Do you think that it is possible to predict with accuracy where the stock market will be in twelve months' time? Give reasons.

3 Anthropology

According to anthropologist Wade Davis, when a sorcerer in an aborigine tribe points at an individual and casts a death spell over him, 'the individual invariably sickens and almost always dies'. One explanation for such cases of 'voodoo death' is that the individual has been conditioned since childhood to believe in the power of the sorcerer's spell. So when the sorcerer curses him, he in effect loses the will to live. He may, for example, retire to his shelter and refuse to eat until he wastes away and dies. The individual's belief that he is going to die seems to be an important factor in his eventual death.

1. Have you ever been caught breaking a **taboo** and said something like 'I feel so ashamed I could die'?
2. Do you think that mental states, such as happiness or depression, can affect our physical well-being?
3. Try to find some information about alleged cases of 'voodoo death'. Do you believe they really happen? If so, how would you account for them?

A final point to notice about predictions is that they can be self-negating as well as self-fulfilling. For example, if I predict that you are going to break your leg playing soccer this afternoon, you will have a strong incentive not to play, thereby falsifying my prediction. In this case, the very act of making the prediction helps to ensure that it does *not* come true.

According to a phenomenon known as **psychological reactance**, if a person is inclined to do X, and you then tell him to do X, he becomes more likely not to do X. This may explain why some teenage anti-smoking campaigns have the perverse effect of *encouraging* teenagers to smoke. With this in mind, how would you try to organise an effective anti-smoking campaign?

Measurement

While measurement plays an important role in the sciences by adding precision to our knowledge, it is generally more difficult to measure things in the human sciences than in the natural sciences. Consider, for example, consciousness. If I were to ask you *how many* thoughts you have had today, I doubt that you could answer this question. Part of the problem is that we have no units for measuring thoughts and determining where one ends and another begins, for they simply melt into one another. Furthermore, if you try to count your thoughts, the very process of counting will interfere with what you are trying to count. So, rather than think of consciousness as a series of discrete thoughts, it may make more sense to follow the American psychologist William James (1842–1910) and think of it as a continuous **stream of consciousness**.

While consciousness played a key role in William James' conception of psychology, some twentieth-century psychologists dismissed it as unscientific on the grounds that it can be neither objectively observed nor precisely measured. This gave rise to a school of psychology known as **behaviourism**, which redefined the subject as the scientific study, not of consciousness, but of *behaviour*. Despite the difficulties involved in trying to pin consciousness down, there are many variables in the human sciences that *can* be measured with relative ease: for example, population, income and the rate of inflation. Furthermore, as the Jared Diamond

reading at the end of this chapter makes clear, human scientists have developed a variety of sophisticated techniques for translating what look like qualitative concepts into measurable ones.

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1. When you try to make sense of other people, do you pay more attention to what they say or to what they do?
2. Do you agree that since consciousness cannot be objectively observed, it should not be part of psychology?
3. Would you be willing to reject talk of electrons in physics and genes in biology on the grounds that they cannot be directly observed?

Who really won the Centennial Olympics?

When we put numbers on things it sometimes creates a spurious sense of objectivity. After the 1996 Olympic Games in Atlanta, an article appeared in a Canadian newspaper headed 'Who really won the Centennial Olympics?' You might think that we can find the answer simply by consulting the official rankings.

Rank	Country	Medals total
1	USA	101
2	Germany	65
3	Russia	63
4	China	50
11	**Canada**	**22**

The above table shows some of the results, ranking the countries in terms of the total number of medals won. The USA came first with 101 medals, and Canada eleventh with 22. However, you might point out that simply knowing the *number* of medals each country got does not give us enough information to decide who really won the Olympics. We also need to know the *colour* of the medals. If the USA had 101 bronze and Germany 65 gold, there would be a strong case for saying that Germany, not the USA, had won the Olympics. Here, then, is the breakdown of medals won:

Country	Gold	Silver	Bronze	Medals total
USA	44	32	25	101
Germany	20	18	27	65
Russia	26	21	16	63
China	16	22	12	50
Canada	**3**	**11**	**8**	**22**

We now have to decide how to *interpret* these figures. Consider Germany and Russia: Germany won two more medals in *total* than Russia, but Russia won six more *gold* medals than Germany. So who did the best? Well, the standard Olympic convention is to award 3 points for a gold, 2 for a silver and 1 for a bronze. Following that convention we get the following results:

Rank	Country	Gold	Silver	Bronze	Points
1	USA	44	32	25	221
2	Russia	26	21	16	136
3	Germany	20	18	27	123
4	China	16	22	12	104
11	**Canada**	**3**	**11**	**8**	**39**

The only change at the top is that Russia and Germany change places. Canada stays in eleventh place.

But what if we now take into account the *population* of each country? After all, the USA has a much larger population base than Canada from which to choose its athletes. (At the time of the Atlanta Olympics, the figures were 255 million as against 28 million.) This dramatically changes the picture. If we now look at points per million we get the following result:

Rank	Country	Points per million
1	Tonga	20
2	Bahamas	6.6
3	Cuba	4.6
25	**Canada**	**1.3**
37	USA	0.9

If we look at the results in this way, some island nations rise to the top of the table. Cuba's results are now more than five times better than those of the USA, and Canada's results are 1.5 times better.

But we don't have to stop there. We might think of more ways of refining the ranking.

- Since children and seniors do not form part of the pool of potential athletes, we should perhaps take into account age distribution, and look not at points per million, but points per million of eligible age – say between 16 and 60.
- We might consider comparative wealth on the grounds that athletes from wealthy countries have better training facilities than their poorer counterparts.
- We might want to compensate for the fact that the USA had 'home advantage' – for it is well known that a team playing at home tends to do better than one playing away from home.

We now risk getting lost in a welter of rankings established in accordance with different criteria. It is beginning to look as if there is no clear answer to the question, 'Who won the Centennial Olympics?' Perhaps we should simply abandon the obsession with ranking countries. That, however, is easier said than done!

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1 Do you think it is possible to answer the question 'Which country won the Centennial Olympics?' Does it matter?

2 'You can no more say that a gold medal is worth three bronzes than that an apple is worth two oranges.' What do you think of this criticism of Olympic rankings?

3 What effect do you think doing well in the Olympics, or winning the World Cup, might have on a country's economy?

4 What value, in general, is there in ranking things? Have you ever looked at university rankings? How seriously do you take them? How seriously should you take them?

One thing that seems to come out of the above discussion is that we run into problems when we try to measure different things – such as gold, silver and bronze medals – on a common scale. People are often accused of 'comparing apples and oranges' when they try to do this. However, an economist might argue that we can in fact compare different things on a common scale by looking at how much people are willing to pay for them. Whether or not it is in practice possible to put a price on everything, I leave for you to decide!

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1 How would you go about trying to put a monetary value on a human life?

2 Can you think of situations in which society does the above? How do you feel about trying to weigh a life in terms of dollars and cents?

3 Which of the following is easy to measure and which is not? How would you go about trying to measure it?

a Weight
b Brand loyalty
c Temperature
d Social class
e Inflation
f Intelligence
g Happiness
h Reading ability
i Progress
j Age

4 What truth do you think there is in the following poem?

Economists have come to feel
What can't be measured isn't real.
The truth is always an amount
Count numbers only numbers count.
[Robert Chambers]

Experiments

We typically associate the word 'science' with a person in a white coat doing experiments in a laboratory. Ideally, experiments should play as big a role in the human sciences as they do in the natural sciences; but in practice this is not usually the case. There are at least three reasons for this.

1. Human scientists are often trying to make sense of complex real-world situations in which it is simply impossible to run controlled experiments.
2. The artificiality of some of the experiments that can be conducted may distort the behaviour of the participants.
3. There are ethical reasons for not conducting experiments that have a negative effect on the people who participate in them.

Faced with the above difficulties, what are human scientists to do? One solution is to wait for nature to provide the appropriate experimental conditions. We can, for example, learn something about how a normal brain functions by looking at people who have suffered brain damage; and we can gain some insight into the roles played by genes and the environment by studying identical twins who have been separated at birth and brought up in different families. In the case of economics, economic history can provide us with a bank of – admittedly not very well-controlled – experimental data.

However, human scientists do not just sit around waiting for natural experiments to arise. They also devise ingenious experiments of their own. Suppose you want to know how a baby sees the world. Does it see it as a 'blooming, banging confusion' as the psychologist William James (1842–1910) thought, or is there more of a structure to its experience? We cannot, of course, ask the baby since it has not yet learnt to speak. So it might seem that all we can do is *speculate*. That is what people thought until two psychologists, Elizabeth Spelke and Renée Baillargeon, pointed out that babies tend to stare at surprising things longer than at unsurprising ones. This key insight was like opening a window on to the developing mind. There was now a way of testing babies' expectations and getting some idea of how they see the world. The resulting experimental evidence suggests that, before they are six months old, babies have figured out that objects consist of parts that move together, are aware of the difference between living and non-living things, and can even do simple arithmetic!

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1. How accurate do you think 'stare time' is as a way of measuring a baby's expectations? What if a baby looks at something for two seconds, looks away for three, and then looks back again for another two?
2. Do you think there is any danger in psychologists seeing what they want to see in these kinds of experiment?

The Milgram experiment

One of the best-known experiments in the history of psychology took place at Yale (USA) in 1963. Stanley Milgram was interested in the extent to which people are willing to obey orders. He advertised for volunteers to participate in an experiment allegedly to 'test the effects of punishment on learning'. When a volunteer arrived he was told that he was to play the role of 'teacher', and another 'volunteer' – in reality an actor – was to play the role of 'learner'. The learner was strapped to a chair and electrodes were put on his wrists. The teacher was then taken to an adjoining room and asked to give the learner a simple memory test. Every time the learner answered incorrectly, the teacher was to give the learner a successively higher electric shock by flicking a switch on a generator. Each switch was clearly labelled with voltage levels ranging from 15 to 450 volts, and verbal descriptions such as 'slight shock', 'strong shock', 'intense shock', 'danger', and finally 'XXX'. Although the teacher could not see the learner, he was able to hear his responses. Once the voltage reached 120V, the learner began to complain; at 150 volts he demanded that the experiment be stopped; at 270V he started screaming; and after 330V there was an ominous silence. Whenever the teacher hesitated to administer a shock, a scientist standing behind him insisted that it was very important that he continue with the experiment. In reality, of course, the learner did not receive any shocks, but the 'teacher' was not aware of this at the time.

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1. Given your knowledge of human nature, what percentage of 100 volunteers do you think would continue administering electric shocks up to 450 volts?
2. If you had been a volunteer in this experiment, what do you think you would have done?

The result of the experiment was that almost two-thirds of the volunteers continued to give electric shocks up to 450 volts. Many expressed concern about what they were doing, and had to be reassured that they would not be held responsible for the fate of the learner; but it did not seem to occur to them to refuse to comply. Only one-third of the volunteers refused to continue to the end.

The Milgram experiment raises some disturbing questions about human nature. Why were so many of the volunteers willing to obey white-coated authority figures and give what they thought were lethal shocks to complete strangers? One crumb of comfort was that if, instead of working alone, the volunteer was paired with two other teachers (who were again actors), and the other teachers rebelled, then only 10% of the volunteers were willing to continue giving shocks up to 450 volts.

Changing perspective, we might question the ethics, not of the participants, but of the experiment. After all, the volunteers were misled about what they were getting involved in, were made to feel uncomfortable during the experiment, and may have suffered a permanent loss of self-esteem once the experiment was over.

You are probably not going to feel great about yourself if you discover that you are the kind of person willing to administer a lethal electric shock to a stranger! On the other hand, it could be argued that the knowledge gained from the experiment outweighs any moral qualms we might have about the way it was carried out.

1 What difference do you think it would have made if the original advertisement asking for volunteers had mentioned electric shocks? What conclusion would you draw from this?

2 Design your own ethical code of conduct for the running of experiments in the human sciences. What three or four key points would you include and why?

Laws

While observation, measurement and experimentation are important parts of the scientific method, the main goal of science is to develop laws and theories to explain the phenomena that it studies. When it comes to the human sciences, however, our belief in **human free-will** would seem to conflict with the idea that there are law-like regularities in human behaviour. How, after all, could we ever reduce the behaviour of inconsistent, wilful and unpredictable human beings to a neat set of laws? Isaac Newton (1642–1727), for one, was doubtful, and famously observed: 'I can calculate the motions of heavenly bodies, but not the madness of crowds.'

Despite Newton's comment, a great deal of human behaviour does in fact seem to be fairly predictable. If people lack food, they are unhappy; if the price of lemons goes up, people buy fewer lemons; and – at least in the last school I worked in – if someone drops their tray in the dining hall, everyone cheers! We make literally thousands of generalisations about human beings every day, and if they were completely unpredictable no one would ever get in to a car and venture onto the road.

1 To what extent do you find the behaviour of your friends and family predictable? Do you ever find that when your parents are giving you advice you are able to finish many of their sentences for them?

2 What makes a person an interesting person? Would you prefer to have predictable friends, or unpredictable friends, or some combination of the two?

3 State three generalisations about human behaviour that you think are true of all human beings.

The law of large numbers

Although individual behaviour may be unpredictable, we can make surprisingly accurate short-term predictions about such things as the number of births, marriages and deaths in a country. The explanation for this derives from the **law of large numbers**, which says that in a large population *random variations tend to cancel out.* For example, there are all kinds of social customs and expectations which affect the

number of people who get married in a particular time period. In general we can say that confirmed bachelors are unlikely to get married and engaged couples are likely to get married. However, random factors are also at work and occasionally confirmed bachelors fall in love and marry, and engaged couples fall out of love and do not. If we are dealing with a large enough population, then the number of unexpected marriages is likely to be cancelled out by the number of unexpected non-marriages.

? Briefly explain how the law of large numbers enables insurance companies to offer cover against risks such as car accidents, house fires, and death.

Since the law of large numbers enables us to predict group rather than individual behaviour, many laws in the human sciences are probabilistic in nature. Although I cannot predict with any certainty whether or not John Smith will get married this year, I may be able to predict the probability of this happening

You might think that such probabilistic laws are inferior to the universal laws that are typically associated with the natural sciences. But in fact the laws governing the behaviour of atoms and genes are also of a probabilistic kind, and a physicist can no more predict the behaviour of an individual gas molecule than a human scientist can predict the behaviour of a man in a crowd.

Trends and laws

Despite the law of large numbers, the human sciences do not have a very good record of prediction. There is, for example, no consensus among demographers about the size of world population in fifty years' time; economic forecasters seem to get it wrong as often as they get it right; and almost no one predicted the collapse of communism in the 1980s. A well-known example of a prediction that turned out to be way off the mark was the one made by the population economist Paul Ehrlich in 1973. Ehrlich was very pessimistic about the state of the planet and he predicted that, by 1990, 65 million Americans would be starving to death. Ironically, that turned out to be the number of Americans who were overweight in 1990!

To understand why the predictions of human scientists sometimes turn out to be wrong, we need to explain the difference between a *trend* and a *law*. Critics argue that too often human scientists have simply uncovered trends rather than genuine laws. A trend shows the direction in which a variable is moving, but since it gives no explanation for the movement it is not very reliable. That is why 'betting on a trend' is a dangerous game. A horse may have won its last three races, and a company may have made profits for the last three years, but this alone does not mean that the horse will win its next race or the company will make a profit next year. If we know something about the horse's breeding and physical condition, or the company's financial background and investment strategy, we are likely to make better predictions than if we simply bet on a trend.

A good example of the danger of betting on a trend is the **Phillips curve** in economics. In the 1960s, an economist called A. W. Phillips gathered data on the

relationship between inflation and unemployment in the UK from 1861 until 1967. The data appeared to suggest a stable relationship between the two, as illustrated in Figure 9.4.

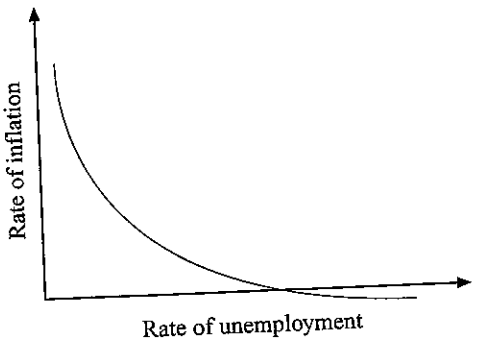


Figure 9.4 A Phillips curve

Many governments understood the curve to show that there was a trade-off between inflation and unemployment, and that lower unemployment could be bought at the cost of higher inflation, and vice versa. Unfortunately, when they tried to reduce unemployment by allowing inflation to rise, the Phillips curve broke down, and for much of the 1970s many countries experienced both rising inflation *and* rising unemployment.

What this example shows is that just because two things are *correlated* it does not follow that the first is the cause of the second. To think that it does is to commit the **fallacy of *post hoc ergo propter hoc*** (see Chapter 5). A correlation between two variables, A and B, could mean either that A causes B, or that B causes A, or that A and B are both caused by some other factor, C.

?

How might you explain each of the following correlations?

a Children with low self-esteem tend to do badly at school.
b People who watch violent movies tend to be violent in real life.
c As a country develops economically, birth rates tend to go down.
d Children brought up by talkative parents tend to be talkative themselves.
e Married people tend to be happier than unmarried people.

The complexity of real-world situations

Another reason why it might be difficult to uncover laws in the human sciences is the complexity of the situations they deal with. In the real world, it is often difficult to untangle a complicated web of causal relationships to determine which one is decisive.

Imagine, for example, that one night a man is driving along a country lane and crashes into a wall. He is lucky to escape unhurt, but his car is a write-off. What caused the crash? Here is some background information.

- The accident happened on a sharp bend on an unlit road.
- There was ice on the road.
- The man was speeding.
- He had drunk two pints of beer earlier in the evening.
- He was known to enjoy driving fast.
- He had just broken up with his girlfriend.

Given this information, it may be impossible to determine the *one* thing that caused the crash. Rather than search for a single cause, it might make more sense to say that it resulted from a *combination* of things. Perhaps if any one of the above facts had been different, the accident would never have happened. What this suggests is that it may be impossible to come up with a simple law of car accidents of the form 'If *X*, then there will be a car accident.'

If it is difficult to determine the cause of a small-scale event like a car accident, then it is a great deal more difficult to determine that of such complex phenomena as teenage depression, crime or inflation. And if we cannot say what the cause of an event was, then it will be hard to predict what will happen when similar events happen in the future. So it is perhaps not surprising that economists sometimes get their forecasts wrong!

Summary: the role of laws in the human sciences

We have seen that, although individuals may be unpredictable, the law of large numbers means that we can sometimes make accurate predictions about the behaviour of a large population. However, some of these predictions are based on trends rather than laws, and we should be careful not to confuse a correlation with a causal connection. In practice, the complexity of real-world situations means that it is difficult to unearth simple laws of the 'If..., then...' variety. Nevertheless, subjects such as economics still have many tried and tested laws, such as the law of demand and the law of diminishing returns.

The relationship between natural and human sciences

When we consider the relationship between the various sciences, it is commonly thought that there is a continuum of subjects running from the 'hard' natural sciences to the 'soft' human sciences. This reflects the fact that the human sciences have generally been held in lower esteem than their natural science cousins. For they seem to lack the explanatory power of Newtonian mechanics, or the atomic theory of gases, or molecular biology. Human scientists themselves have sometimes envied the mathematical rigour, immutable laws and cumulative nature of the natural sciences; and some people might even agree with Ernest Rutherford's (1871–1937) dismissive observation that, 'The only possible conclusion the social sciences can draw is: some do, some don't.'

? Do you think there is a hierarchy of sciences? If so, try to order the various sciences according to any criteria of your choice. If not, explain why not.

Doubtless, subjects such as psychology, economics and anthropology are a great deal more valuable than uninformed common sense in helping us to make sense of the human condition. Nevertheless, there is a suspicion in some quarters that they still lack the well-established paradigms that characterise the natural sciences. Consider, for example, the following comparison between biology and psychology by the neuroscientists V. S. Ramachandran and J. J. Smythies:

> Anyone interested in the history of ideas would be puzzled by the following striking differences between advances in biology and advances in psychology. The progress of biology has been characterized by landmark discoveries, each of which resulted in a breakthrough in understanding – the discoveries of cells, Mendel's law of heredity, chromosomes, mutations, DNA and the genetic code. Psychology, on the other hand, has been characterized by an embarrassingly long sequence of 'theories,' each really nothing more than a passing fad that rarely outlived the person who proposed it.

Reductionism

Some thinkers hold out the hope that, as our knowledge in areas such as neuroscience and genetics grows, it will eventually be possible to establish the human sciences on firmer foundations. Since it seeks to explain some subjects in terms of other, more fundamental, ones, such a position is known as **reductionism**. A reductionist might, for example, argue that one day we will be able to understand economics in terms of psychology, and psychology in terms of neuroscience. At the limit, a reductionist might argue that everything is ultimately a matter of atoms whizzing around in space in accordance with the laws of physics (see Figure 9.5).

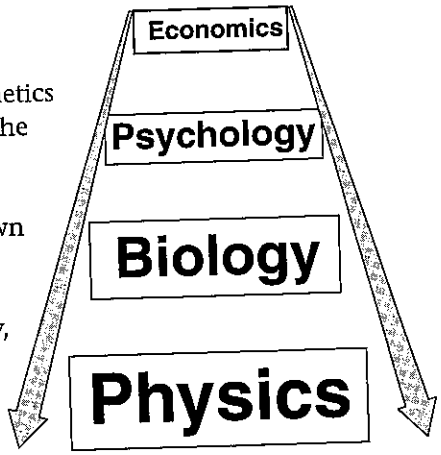


Figure 9.5 Reductionism

Since science is supposed to explain complex phenomena in terms of simpler underlying principles, reductionism might seem to be an attractive position. A subject such as physics has, after all, been amazingly successful in explaining a wide variety of phenomena in terms of a small number of underlying laws. A good example of the success of this approach was the reduction of thermodynamics to mechanics, which enabled scientists to explain heat in terms of the motion of molecules. Perhaps in a similar way we will one day be able to explain mental phenomena in terms of underlying physical ones.

The reductive fallacy

When we try to explain complex things in terms of simpler underlying ones, there is, however, a danger that we commit the **reductive fallacy**. This is the fallacy of saying that just because *A* is composed of *B* it follows that *A* is *nothing but B*. Here are some examples of such 'nothing-butism':

A cathedral is nothing but a heap of stones.
A violin sonata is nothing but a sequence of vibrating strings.
A human being is nothing but a bunch of chemicals.

At one level, it is true that we are 'just a bunch of chemicals'; and it is humbling to discover that there is no secret ingredient in the recipe for a human being, and that we are made of the same basic stuff as cats, cucumbers and chrysanthemums. Nevertheless, there is all the difference in the world between so much hydrogen, oxygen and carbon measured out in a chemistry laboratory and a living human being. We may know the ingredients that make up a human being, but we are still very far from understanding the recipe!

There are, in fact, good reasons for doubting that the reductionist programme can succeed. For it has been pointed out that when simple things are combined together the resulting properties cannot always be predicted in advance from their constituent elements. This is as true in the physical world as in the human world. For example, if you combine hydrogen with oxygen, the property of wetness emerges from two non-wet elements. Similarly, when you combine sodium, one of the most unstable elements, with chlorine, one of the most toxic, you end up with salt – a stable compound which tastes good on food!

Since we cannot even reduce chemistry to physics, it seems unlikely that we will ever be able to explain the human sciences in terms of physics. In any case, the resulting knowledge would probably not be very useful. Trying to understand the laws of supply and demand at the level of atoms and molecules would be like trying to learn a computer program by analysing the flow of electrons through the electrical circuits. If you want to know what determines the price of fish, you would do better to read a book on economics than one on atomic physics!

Holism

The reductionist idea that the best way to understand something is to break it up into parts seems particularly inappropriate when it comes to the study of living things. For, as the writer Douglas Adams (1952–2001) observed, 'If you try to take a cat apart to see how it works, the first thing you have on your hands is a non-working cat.' This might suggest that we can only make sense of some things by looking at them as a whole. Such a view is known as **holism**, and its central claim is that *the whole is greater than the sum of the parts* – that the whole contains properties that cannot in principle be discovered through an analysis of the parts.

When applied to the human sciences, holism means that you cannot understand a group only in terms of the individuals that make it up, or an action independent of the context in which it takes place. Thus economists distinguish between macro-economics – which studies the economy as a whole – and micro-economics – which

studies the behaviour of individual economic agents – on the grounds that you cannot understand a complex economy simply by analysing the behaviour of individual economic agents. And anthropologists insist that you should immerse yourself in a culture before trying to make sense of its individual practices. At a more mundane level, you may have noticed that a class at school can have an atmosphere which cannot always be explained in terms of the people in it.

1 Do you think that a group can have a 'character' that is distinct from the individuals that make it up?

2 A football team may consist of eleven great players and yet do badly in the league. How would you explain this?

3 What do you understand by 'team spirit'? Is 'team spirit' the sum of the 'spirit' of each individual on the team? If not, where does it come from?

At the heart of the argument between holism and reductionism is the question of the relation between wholes and parts. Rather than make an *either–or* choice between these two positions and say that you must understand the whole in terms of its parts, or the parts in terms of the whole, perhaps it would be better to think in terms of there being two-way traffic between parts and wholes. Take, for example, the relation between individuals and society. Although society is influenced by the individuals that make it up, it is also true that individuals are affected by the society they live in. To ask which comes first may make no more sense than asking whether the chicken comes before the egg or the egg before the chicken.

The *Verstehen* position

One reason for doubting that we will ever be able to reduce the human sciences to the natural sciences is that they typically explain things in terms of *meanings* and *purposes* rather than mechanical causes and effects. To illustrate the difference between these kinds of explanation, imagine that a group of Martian scientists land on planet Earth on a busy road near some traffic lights. They notice that when the lights turn red the traffic stops and when the lights turn green it moves again. After observing the traffic for several hours, they conclude that red light causes a temporary malfunction in car engines. Unfortunately, they have come up with the wrong *kind* of explanation. What causes the traffic to behave as it does is the existence of a social *rule* which says that a red light *means* stop and a green light *means* go. If the Martians analyse the situation in terms of physics they will never figure out what is happening – for you cannot conjure social rules out of atoms and molecules.

According to what is known as the ***Verstehen* position** – *Verstehen* is German for 'understanding' – the main aim of the human sciences is to understand the meaning of various social practices *from the inside* as they are understood by the agents themselves. The common sense of this is that, if you want to figure out what a group of people are up to, you cannot simply observe their physical movements, but must try to get 'inside their heads' and understand how *they* see the situation. If you are unable to do this, then you are likely to misunderstand what is happening. For example, a Martian anthropologist who knows nothing about sports might misinterpret a cricket match as a religious ritual in which a bowler tries to kill a batsman with a speeding projectile.

?

Imagine that you are such a Martian anthropologist with no understanding of human practices. Try to think up bizarre explanations for some of the following rituals:

a Eating at McDonalds
b Taking an IB exam
c Attending a birthday party
d Checking in at an airport
e Shopping at a supermarket
f Working out in a gym
g Going to the hairdressers

Since many explanations in the human sciences are in terms of meaning rather than mechanism, it is perhaps not surprising that the human sciences have few universal laws to their credit. For the meaning of an action depends on the *context* in which it takes place, and it is therefore difficult to generalise. For example, if a man is writing his name on a piece of paper, he could be writing a cheque, giving an autograph, or signing a death warrant. Since the consequences of the same physical action are completely different in each case, you cannot make a universal law of the form, 'If a person writes his name, then...'

?

Think of as many different explanations as you can for each of the following actions:

a A woman picks up a glass of wine.
b A man goes out with an umbrella.
c A woman walks into a room, walks round, and walks out again.
d A man gets a gun out.
e A woman waves her hand.

While the *Verstehen* approach to making sense of human behaviour is illuminating, we should not get carried away with it. Just because a lot of human behaviour can only be understood in context, we should not, for example, conclude that there are *no* universals in the human sciences. On the contrary, anthropologists have found many traits that seem to be common to all cultures – including gossiping, joking, and taking an interest in sex!

We should also be cautious about taking people's self-descriptions at face value, for the consequences of their actions sometimes bear little relation to their intentions. In the case of economics, Adam Smith (1723–90) famously argued that although individuals tend to seek their own gain, they are led by an 'invisible hand' to promote the general good. For example, an entrepreneur's desire for profit may result in our ending up with cheap high-quality goods and services. This suggests that as well as trying to understand people's behaviour from the inside, social scientists should also look at the *unintended consequences* of their actions. When it comes to studying something as complicated as a human being, there is no reason why we should limit ourselves to a single approach. Truth has many eyes!

The problem of bias

One common accusation against the human sciences is that they are more prone to bias – and therefore less scientific – than their natural science cousins. We are, after all, more likely to begin with prejudices about the nature of individuals and societies than we are about the nature of atoms and molecules. This means that we may find it difficult to be genuinely open-minded about controversial topics such as gender differences or taxation policy. In this situation, the danger is that we simply look for evidence that confirms our pre-existing prejudices while overlooking evidence that contradicts them.

Since we naturally form emotional attachments with other people, a related problem is that a human scientist may over-identify with the people she is studying. When, for example, an anthropologist 'goes native' and lives with a tribe, her insider's understanding of the culture may be bought at the expense of her ability to be objective.

At this point, it is worth recalling that bias can also be a serious problem in the natural as well as the social sciences (see our discussion of **confirmation bias** on pages 230–1). A physicist, for example, may be so committed to his own pet theory that he obstinately refuses to abandon it in the light of contrary evidence. Since natural scientists are only human, they will sometimes be swayed by emotion as well as reason, and there are plenty of controversies in physics, chemistry and biology that are as vicious and partisan as anything that can be found in the human sciences.

Whatever the subject matter, a good antidote to bias is to make it a matter of principle to actively look for evidence that would count *against* your hypothesis. For example, if you think that younger siblings are more rebellious than older ones, you should not only trawl for evidence that confirms your hypothesis, but also look for examples of rebellious older siblings and conformist younger ones. Fortunately, scientists routinely check up on and criticise one another's results, and this helps to ensure that poor and obviously biased research is discredited. Indeed, it could be argued that one of the great strengths of science is that in the long run it tends to be self-correcting – and there is no reason to think that this is any less true of the human sciences than of the natural sciences.

1 Who do you think would be the best judge of a child's character?
a their parents
b their teachers
c a professional psychologist

Give reasons.

2 Give some specific examples of bias that you have come across in the natural sciences and human sciences that you have studied.

3 Explain what is meant by 'falsificationism', and how it can help to reduce the danger of bias in scientific research. (You may wish to refer back to Chapter 8 to remind yourself about falsificationism.)

Predictions

We saw in our discussion of laws and trends that the human sciences have been less successful than the natural sciences in making accurate predictions. In seeking to explain this fact, three points can be made in their defence:

1 The human sciences usually deal with extremely complex situations in which it is not possible to run controlled experiments. Indeed, it could be argued that when critics contrast the success of the natural sciences with the lack of success of the human sciences they are not comparing like with like. For it is a great deal more difficult to make accurate predictions in the real world than in the controlled conditions of the physics laboratory. You may, for example, know a lot of physics, but still be unable to predict where a leaf blown off a tree on a windy autumn day will land. Changing the analogy, we might say that trying to predict human behaviour is a bit like trying to predict the course of a water molecule going over Niagara Falls. While there is nothing difficult about it in theory, in practice there are simply too many variables for us to be able to make accurate predictions.

Do you think that weather forecasting is generally more or less reliable than economic forecasting?

2 Some of the predictions made by social scientists are valuable, not because they accurately describe the future, but because they give us an incentive to change it. If, for example, economists in Ruritania predict that unemployment is likely to rise by 20 per cent in the next two years unless something is done, then the Ruritanian government will have a strong incentive to change its policies and try to ensure that the prediction is falsified.

3 Advocates of the *Verstehen* position might argue that the purpose of the human sciences is not so much to explain and predict as to describe and understand.

The above points might help to explain the human sciences' poor record of prediction. But a critic might give a less flattering explanation and argue that the human sciences' lack of success shows that they are at a pre-paradigm stage in their development and await a Newton to establish them on a proper scientific foundation.

? Look at the table below. In seeking to defend the human sciences, how would you respond to each of the problems mentioned?

Human sciences: summary of problems	
Observation	1. We cannot directly observe other people's minds. 2. Questionnaires may be misleading or biased. 3. Observing people may affect the way they behave.
Measurement	4. Social phenomena are difficult to measure.
Hypothesis	5. The act of prediction may affect the behaviour predicted.
Experiments	6. Human sciences study complex social situations in which it is difficult to run controlled experiments. 7. Various moral considerations limit our willingness to experiment.
Laws	8. Human sciences are not very good at predicting things. 9. Human sciences usually uncover trends rather than laws. 10. Science laws are probabilistic in nature.

Conclusion

We might conclude our discussion of the human sciences by saying that they are neither as flawed as their critics believe nor as successful as their defenders hope. Since they deal with complex phenomena, it is perhaps not surprising that they seem to lack the explanatory power of the natural sciences. Nevertheless, we can learn a great deal more about human beings by studying subjects such as psychology, economics and anthropology than we can by relying on uninformed common sense.

Any discussion about the human sciences inevitably raises some big questions about our place in the scheme of things. How, for example, are minds related to bodies? Could a machine think? Do we have free-will? Could a mind exist without a body? Perhaps scientific research will cast light on these questions, but it may be that in this area there are mysteries that will always lie beyond our understanding.

Key points

- Since human beings seem to be different from other natural phenomena, we may wonder to what extent they can be studied in a purely scientific way.
- Among the problems that arise in trying to get information about other people are that it is difficult to frame questions in a neutral way and that observing people may affect the way they behave.
- Some important phenomena in the human sciences are difficult to measure, and this can make it difficult to study them scientifically.
- Social scientists have devised many ingenious experiments, but ethical considerations limit our ability to conduct experiments on human beings.
- Although a great deal of human behaviour is predictable, it is unclear how far it can be reduced to law-like regularities.
- Since we typically explain human behaviour in terms of its meaning and purpose, we may never be able to reduce the human sciences to the natural sciences.
- Since they deal with controversial topics, the human sciences are more prone to bias than the natural sciences, but the extent of the problem should not be exaggerated.
- A question that continues to perplex both scientists and philosophers is how the mental is related to the physical.

Terms to remember

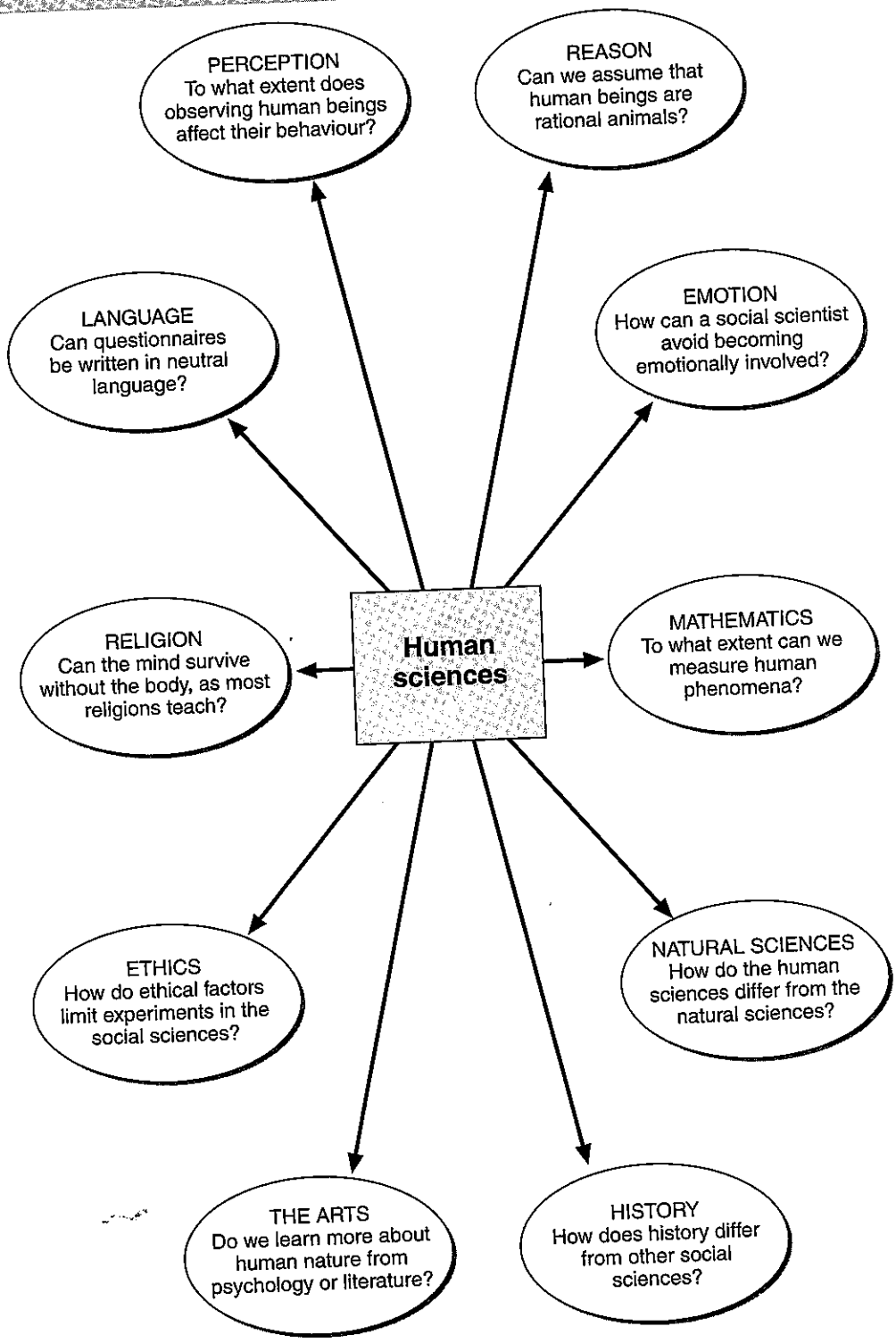
bear market
behaviourism
bias
bull market
free-will
going native
holism
human free-will
law of large numbers
loaded question
mirror test
nature–nurture debate
observer effect
Phillips curve
post hoc ergo propter hoc fallacy
reactance
reductionism
reductive fallacy
stream of consciousness
trends and laws
Verstehen position

Further reading

Reuben Abel, *Man is the Measure* (Macmillan, 1976), Chapter 11: 'The social sciences'. This chapter is a good introductory account of the social sciences. A large part of it is taken up with an excellent discussion of the *Verstehen* position.

Steven Pinker, *The Blank Slate* (Penguin, 2002), Chapter 17: 'Violence'. Pinker argues that many human traits, such as violence, are more the result of genetic inheritance than environmental conditioning. He writes with such verve and style that, whatever your own beliefs, this chapter should engage your interest.

Linking Questions



Reading Resources

SOFT SCIENCES ARE OFTEN HARDER THAN HARD SCIENCES

In this extract, Jared Diamond questions the commonly held prejudice that the human sciences are somehow easier or less rigorous than their natural science cousins.

We often view hard science [physics, chemistry, molecular biology] as the only type of science. But science (from the Latin *scientia* – knowledge) is something much more general, which isn't defined by decimal places and controlled experiments. It means the enterprise of explaining and predicting – gaining knowledge of – natural phenomena, by continually testing one's theories against empirical evidence. The world is full of phenomena that are intellectually challenging and important to understand, but that can't be measured to several decimal places in labs. They constitute much of ecology, evolution, and animal behaviour; much of psychology and human behaviour; and all the phenomena of human societies, including cultural anthropology, economics, history, and government.

The soft sciences, as they are pejoratively termed, are more difficult to study for obvious reasons. A lion hunt or revolution in the Third World doesn't fit inside a test tube. You can't start it and stop it whenever you choose. You can't control all the variables; perhaps you can't control *any* variable. You may even find it hard to decide what a variable is. You can still use empirical tests to gain knowledge, but the types of tests used in the hard sciences must be modified. Such differences between the hard and soft sciences are regularly misunderstood by hard scientists, who tend to scorn soft sciences and reserve special contempt for the social sciences...

The issue that... is central to any science, hard or soft... may be termed the problem of how to 'operationalize' a concept... To compare evidence with theory requires that you measure the ingredients of your theory. For ingredients like weight or speed it's clear what to measure, but what would you measure if you wanted to understand political instability? Somehow, you would have to design a series of actual operations that yield a suitable measurement – ie, you must operationalize the ingredients of theory.

Scientists do this all the time, whether or not they think about it. I shall illustrate operationalizing with four examples from... research, progressing from hard science to softer science.

Let's start with mathematics, often described as the queen of the sciences. I'd guess that mathematics arose long ago when two cave women couldn't operationalize the intuitive concept of 'many'. One cave woman said, 'Let's pick this tree over here, because it has many bananas.' The other cave woman argued, 'No, let's pick that tree over there, because it has more bananas.' Without a number system to operationalize their concept of 'many', the two cave women could never prove to each other which tree offered better pickings.

There are still tribes today with number systems too rudimentary to settle the argument. For example, some Gimi villagers with whom I worked in New Guinea have only two root numbers, *iya* = 1 and *rarido* = 2, which they combine to operationalize somewhat larger numbers: 4 = *rarido-rarido*, 7 = *rarido-rarido-rarido-iya* etc. You can imagine what it would be like to hear two Gimi women arguing about whether to climb a tree with 27 bananas or one with 18 bananas.

Now let's move to chemistry, less queenly and more difficult to operationalize than mathematics but still a hard science. Ancient philosophers speculated about the ingredients of matter, but not until the eighteenth century did the first modern chemists figure out how to measure these ingredients. Analytic chemistry now proceeds by identifying some property of a substance of interest, or of a related substance into which the first can be converted. The property must be one that can be measured, like weight, or the light the substance absorbs, or the amount of neutralizing agent it consumes.

For example, when my colleagues and I were studying the physiology of hummingbirds, we knew that the little guys liked to drink sweet nectar, but we would have argued indefinitely about how sweet sweet was if we hadn't operationalized the concept by measuring sugar concentrations. The method we used was to treat the glucose solution with an enzyme that liberates hydrogen peroxide, which reacts (with the help of another enzyme) with another substance called dianisidine to make it turn brown, whereupon we measured the brown colour's intensity with an instrument called a spectrophotometer. A pointer's deflection on the spectrophotometer dial let us read off a number that provided an operational definition of sweet. Chemists use that sort of indirect reasoning all the time, without anyone considering it absurd.

My next-to-last example is from ecology, one of the softer of the biological sciences, and certainly more difficult to operationalize than chemistry. As a bird-watcher, I'm accustomed to finding more species of birds in a rain forest than in a marsh. I suspect intuitively that this has something to do with a marsh being a simply structured habitat, while a rain forest has a complex structure that includes shrubs, lianas, trees of all heights, and crowns of big trees. More complexity means more niches for different types of birds. But how do I operationalize the idea of habitat complexity, so that I can measure it and test my intuition?

Obviously, nothing I do will yield as exact an answer as in the case where I read sugar concentrations off a spectrophotometer dial. However, a pretty good approximation was devised by one of my teachers, the ecologist, Robert MacArthur, who measured how far a board at a certain height above the ground had to be moved in a random direction away from an observer standing in the forest (or marsh) before it became half obscured by the foliage. That distance is inversely proportional to the density of the foliage at that height. By repeating the measurement at different heights, MacArthur could calculate how the foliage was distributed over various heights.

In a marsh all the foliage is concentrated within a few feet of the ground, whereas in a rain forest it's spread fairly equally from the ground to the canopy. Thus the intuitive idea of habitat complexity is operationalized as what's called a foliage height diversity index, a single number. MacArthur's simple

operationalization of these foliage differences among habitats, which at first seemed to resist having a number put on them, proved to explain a big part of the habitat's differences in numbers of bird species. It was a significant advance in ecology.

For the last example let's take one of the softest sciences, one that physicists love to deride: clinical psychology. Marie works with cancer patients and their families. Anyone with personal experience of cancer knows the terror that a diagnosis of cancer brings. Some doctors are more frank with their patients than others, and doctors appear to withhold more information from some patients than from others. Why?

Marie guessed that these differences might be related to differences in doctors' attitudes towards things like death, cancer, and medical treatment. But how on earth was she to operationalize and measure such attitudes, convert them to numbers, and test her guesses?...

Part of Marie's solution was to use a questionnaire that other scientists had developed by extracting statements from sources like tape-recorded doctors' meetings and then asking other doctors to express their degree of agreement with each statement. It turned out that each doctor's responses tended to cluster in several groups, in such a way that his responses to one statement in a cluster were correlated with his responses to other statements in the same cluster. One cluster proved to consist of expressions of attitude towards death, a second cluster consisted of expressions of attitudes toward treatment and diagnosis, and a third cluster consisted of statements about patients' ability to cope with cancer. The responses were then employed to define attitude scales, which were further validated in other ways, like testing the scales on doctors at different stages in their careers (hence likely to have different attitudes). By thus operationalizing doctors' attitudes, Marie discovered (among other things) that doctors most convinced about the value of early diagnosis and aggressive treatment of cancer are the ones most likely to be frank with their patients.

In short, all scientists, from mathematicians to social scientists, have to solve the task of operationalizing their intuitive concepts... Physicists have to resort to very indirect (albeit accurate) operationalizing in order to 'measure' electrons. But the task of operationalizing is inevitably more difficult and less exact in the soft sciences, because there are so many uncontrolled variables. In the four examples I've given, number of bananas and concentration of sugar can be measured to more decimal places than can habitat complexity and attitudes towards cancer.

Unfortunately, operationalizing lends itself to ridicule in the social sciences, because the concepts being studied tend to be familiar ones that all of us fancy we're experts on. Anybody, scientist or no, feels entitled to spout forth on politics or psychology, and to heap scorn on what scholars in those fields write. In contrast, consider the opening sentences of [the mathematician] Lang's paper *Diophantine Approximation on Abelian Varieties with Complex Multiplication*: 'Let A be an abelian variety defined over a number field K. We suppose that A is embedded in projective space. Let Ak be the group of points on A rational over K.' How many people feel entitled to ridicule these statements while touting their own opinions about abelian varieties?

Is economics a science?

In the two articles below, Arthur Williamson and Seamus Hogan debate whether or not economics is a genuine science.

An unbiased account from a physical-chemist's point of view

Arthur Williamson, First Vice President New Zealand Institute of Chemistry

Recently I have noticed that economists have begun to draw on some of the jargon and concepts of physical chemistry and are using the ideas of thermodynamics to support their assertions about the possibility of continued economic growth. I guess this gives a thermodynamicist some reciprocal right to expound on the methods of economics.

An aspect of economics that interests me is the relationship between theory and real behaviour. In both fields it appears that one can devise theories about the behaviour of a system and then use them to make predictions about the future behaviour of the system, which can then be compared with actual behaviour. At this point physical science and economics seem to diverge. When actual and predicted behaviour differ, the physical scientist generally concludes that either the observations or the theory are in error. If the observations are trustworthy, then the theory has to be wrong. In economics there seems to be a third possibility which is illustrated by the current 'free market' approach. In this case disagreement between prediction and actuality is often ascribed to 'market failure'. I imagine that the equivalent in physical science would be to say that a disagreement between theory and experiment is due to 'reality failure'. Perhaps even more mystifying to the physical scientist is the fact that the economist will then sometimes go one step further and propose a measure to 'correct' this failure. This is equivalent to the physical scientist attempting to bring reality more into line with the existing theory.

One must conclude that the relationship between theory and reality is indeed different in these two fields. Physical science aims at elucidating characteristics assumed to be inherent in the system and expressed in its behaviour, while economics seems to be about the construction of models and attempts to impose these models on the system. To my mind the ability that the economist has to 'interfere' with the object of his theory adds a dimension of subjectivity that is not present in physical science and suggests that there can be no inherent rightness in any particular economic theory.

A reply

By Seamus Hogan, Department of Economics, McGill University, Montreal

There are a number of similarities in the methodologies of physical science and economics. Unfortunately, the similarities in substance are not as great as the similarities in the language used to express the substance. A lot of our

technical language is borrowed from the physical sciences (principally physics, since many of the economists who first brought mathematical rigour to the subject earlier this century had received their original training in physics). Naturally, the borrowed language has taken on its own meaning in economics, adapting to the differences in the disciplines. This can lead to misunderstanding if professionals from one area try to read material from the other.

One similarity between the physical sciences and economics is that both involve the systematic investigation of complex phenomena. The human brain has only a limited capacity to comprehend complex systems of interacting forces without an organizing framework. One way of providing such a framework is to invent ideal worlds that contain many of the interactions that we wish to comprehend but are still relatively simple and can be used as benchmarks against which the real world is analysed.

For instance, a physicist might consider the dynamics of a body on a frictionless surface attached to an ideal spring (i.e. a spring that has no mass and gives rise to a restoring force that is proportional to the distance the body is displaced from rest). Obviously, ideal springs or frictionless surfaces do not exist, but it is easier to comprehend the observed behaviour of a spring by considering how the presence of friction or spring mass distort the dynamics that it is trying to model. Similarly, modern economic theory is built on a mathematical structure that can analyse the simultaneous interaction of all decision-making agents in an economy (consumers, firms, governments, etc). This structure makes a number of simplifying assumptions that are palpably false, but, as with the ideal spring, it provides a benchmark, exceptions from which generate our comprehension of the real economic world.

One reason for calling the simplified worlds 'ideal' is that they often contain a number of desirable properties that one would like to approximate in practice (e.g. minimizing friction can reduce the amount of energy that one needs to supply in order to achieve a particular amount of work). Since the economic benchmark also has some desirable properties, one set of real-world deviations from this benchmark are termed 'market failures'. To continue with the analogy, an economist's recommendation that economic policy be used to remove a market failure would be equivalent to a physicist's recommendation that a lubricant be used to reduce friction.

Professor Williamson's final point is that 'the ability of an economist to "interfere" with the object of his theory adds a dimension of subjectivity which is not present in physical science'. There is an important difference between physical sciences and economics in the methodology of connecting theory (in the physical science use of the term) and reality. The most important of these is that economists can almost never use controlled experiments. One can think of a controlled experiment as being an attempt to create the conditions of an imagined 'ideal' world in order to isolate a small number of phenomena from the distractions of real-world interactions. Economics certainly does have a 'dimension of subjectivity which is not present in physical science', but this is precisely because the economist cannot 'interfere' with the object of his theory in the way that a physical scientist can through the use of controlled experiments.

Appendix to Chapter 9: The free-will problem

Introduction

One of the issues that we touched on in our discussion of the human sciences was the problem of free-will. This concerns the question of how we can reconcile the belief that human beings have free-will with our scientific picture of the world. Since it raises questions about both our place in the universe and the nature of knowledge, it is worth looking at this problem in more detail.

At first sight, the existence of free-will seems to be a self-evident and unproblematic fact. In our everyday negotiations with the world, we constantly experience ourselves making choices about our actions. To take a trivial example, suppose at lunch-time you are faced with a choice between a pizza and a hamburger – both of which you like – and that you choose the pizza. There is nothing that *compelled* you to choose the pizza, and you could just as easily have taken the hamburger if you had wanted to. So in making your choice you surely exercised free-will. There seem to be countless equally simple and compelling demonstrations of free-will. Right now, you can, for example, either raise your hand or not raise it, and nothing is forcing you to choose one way or the other.

Our belief in free-will is not only based on our own experience, but is also deeply embedded in the way we think about other people; and it is hard to imagine how social life could function without it. Every time you praise or criticise someone's actions, you are implicitly assuming that they are free and that they could have done otherwise. Indeed, the whole of ethics is based on the assumption that we have free-will. It would, after all, be unreasonable to pass judgement on someone for doing something that they couldn't help doing and about which they had no choice. That is why we do not hold insane people criminally responsible for their actions. The existence of free-will, then, is central to our conception of what it is to be a responsible human being, and to deny its existence would seem to rob us of our dignity and reduce us to the status of biological machines.

"I told my parents that if grades were so important they should have paid for a smarter egg donor."

Figure 9A.1

Determinism

Despite such troubling consequences, some scientists and philosophers have nevertheless denied that human beings have free-will and have adopted a position known as **determinism**. According to this, the universe operates in accordance with the causal principle that every event has a cause. Since this

principle is said to apply to human actions as well as the natural world, determinists believe that our actions can ultimately be traced back to factors beyond our control, thereby robbing us of our free-will.

The determinist position would seem to be supported by scientific developments in areas such as genetics which confirm the common-sense observation that we inherit many of our personality traits from our parents. Admittedly social scientists may argue about whether our characters are determined more by 'nature' in the form of our genetic inheritance, or 'nurture' in the form of the environment in which we grow up; but, whatever the proportions, neither of these alternatives seems to leave much room for free-will. After all, you chose neither your genes nor the family in which you grew up.

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1 How different do you think your personality would have been if you had been adopted at birth and brought up in a different culture?

2 Some controversial research has been done which suggests that there are striking similarities between identical twins who were separated at birth and brought up by different families.
   a Find out something about this research and some of the criticisms that have been made of it.
   b What would you conclude about the roles played by nature and nurture in determining our characters?

3 How far do you think our behaviour is determined by unconscious motives? How might one go about testing such a hypothesis?

4 To what extent do you think the behaviour of the following individuals is predictable?
   a Your parents **b** Your friends **c** You

Further support for determinism would seem to come from our knowledge of the brain. A determinist might point to the fact that our mental activities are correlated with various brain states, and that our brains are subject to the laws of physics and chemistry. As far as neuroscience is concerned, when you do something, such as raise your arm, the cause of your action is the various neurons firing in your brain. This pattern of neuronal activity is in turn caused by the previous material state of your brain, which is in turn caused by an earlier state, and so on in a backward chain. Looked at in this way, it seems that the real causes of our actions are to be found at the level of physics and chemistry, and the feeling that they flow from our freely made decisions is merely a beguiling illusion.

Perhaps the most comprehensive case for determinism can be made at the level of atoms moving around in space in accordance with the laws of physics. As the French mathematician Pierre Laplace (1749–1827) famously expressed it:

> We ought to regard the present state of the universe as the effect of its antecedent state and as the cause of the state that is to follow. An intelligence knowing all the forces acting in nature at a given instant, as well as the momentary positions of all things in the universe, would be able to comprehend in one single formula the motions of the largest bodies as

> well as of the lightest atoms in the world, provided that its intellect were sufficiently powerful to subject all data to analysis; to it nothing would be uncertain, the future as well as the past would be present to its eyes.

According to Laplace, then, every event in the universe has been rigorously determined by the preceding one, and it is – in principle at least – possible to predict the entire future history of the universe. In this bleak and uncompromising picture of things, there seems to be no room for human free-will.

How does determinism threaten free-will?

To respond to the threat that determinism poses to our belief in free-will, we should begin by clearing up two common misconceptions which may help to reduce the gap between the two positions.

On the one hand, a believer in free-will is not saying that we are free to do anything we like, and would readily admit that we are limited in various ways by our nature and environment. Indeed, one of life's great frustrations is to bump up against our own limitations. You may desperately want to be a concert pianist, but if you have a tin ear and a poor sense of timing, then, sadly, you are never going to make it. Since we are not endlessly talented, it is clear that we all have a restricted menu of options in the banquet of life. Nevertheless, a believer in free-will insists that we do *still* have options, and that, at least sometimes, we are capable of exercising them and making genuinely free decisions.

On the other hand, a determinist is not saying that the future is determined irrespective of what you do. For that would be to adopt fatalism, and determinism is not the same as fatalism. According to fatalism, your destiny is written in the stars and there is nothing that *you* can do to change the future. This belief is, I think, straightforwardly false. For it is clear that what you do *does* affect the future. If, for example, you work hard, then you are more likely to pass your exams than if you do nothing. Admittedly, there are no guarantees, but what you do will certainly change the balance of probabilities. So much for fatalism. Coming back to determinism, a good way to think of it is as steering between fatalism and free-will. Against fatalism, it says that the choices you make do affect the future; but, against free-will, it says that you have no control over your choices.

To summarise, we can say that a believer in free-will will accept that much of our behaviour is determined by factors beyond our control; and a determinist will accept that the choices we make do affect our future. Yet a seemingly unbridgeable gap remains between these two positions. For a believer in free-will will continue to insist that there is some space for genuinely free decisions, and that is something which a determinist will continue to deny.

Faced with the free-will problem, I think there are at least three possible responses we could make. We could:

1. reject the claim that every event has a cause and argue that this leaves room for free-will
2. accept determinism, but insist that free-will and determinism are compatible with each other
3. accept determinism and conclude that, no matter how unpalatable it might be, human free-will is an illusion.

Does every event have a cause?

With the first of the above options in mind, let us begin by asking what evidence there is for the claim that every event has a cause. You might say that it is an *empirical* claim which is supported by the fact that, as science has developed, we have discovered the causes of more and more events. Extrapolating from this, it seems reasonable to suppose that if we look hard enough we can always find the cause of an event. We may not know the exact cause of AIDS, but nobody doubts that there is a cause, and most people believe that we will eventually discover it.

Thinking about it, I rather doubt that we would allow anything – in the physical world, at least – to count against our belief that every event has a cause. Imagine, for example, that your table lamp suddenly stops working. You check the bulb, and the fuse and the electricity supply, but are unable to find the cause of the problem. You call an electrician, but he is no more successful than you. Do you conclude that you have discovered an uncaused event and that there was no reason why your lamp stopped working? No, you conclude that you hired an incompetent electrician! I suspect that, even if you never solve the problem, you will still insist that *something* must have caused your lamp to stop working.

? If you were unable to find the cause of an event, would you ever be willing to conclude that it did not have a cause?

This suggests that the belief that every event has a cause is not so much an empirical one that can be verified or falsified by evidence as a metaphysical one about the nature of ultimate reality. What makes it attractive is the underlying belief that the universe is an orderly place in which things don't happen randomly or for no reason. Indeed, without some such belief, science – which is essentially a search for causes – would be impossible.

Subatomic randomness

Now, it might be pointed out that there is an area of science where the causal principle that every event has a cause does not seem to hold. For, the world of subatomic particles is governed by **Heisenberg's uncertainty principle** which says that it is impossible to know both the position and velocity of subatomic particles with complete certainty. It would seem to follow that – at this level, at least – events are governed by pure chance.

The indeterminacy that can be found at the subatomic level might seem to loosen the vice-like grip of the causal principle, and provide a physical basis for our belief in free-will. There is, however, reason to think that what is happening at the subatomic level is irrelevant to the free-will problem. For even if random events sometimes occur, mere randomness is not what the believer in free-will is looking for. Imagine, for example, that you are holding a gun and that a random event in your brain causes various neurons to fire which results in your finger squeezing the trigger. You would be as surprised as anyone else by what had happened and could

hardly be held responsible for it. *So free-will is not the same as random will*; and in rejecting determinism we do not want to say that our actions are uncaused, but rather that they are caused by our wills. In any case, Heisenberg's uncertainty principle applies only to the subatomic level, and when it comes to anything bigger – which is everything that is of interest to us – physicists are agreed that the law of cause and effect still holds sway.

Capturing a free action

Despite the above discussion, a believer in free-will might say that, no matter what physics says, we should not be bullied into denying the plain facts of experience. For our immediate experience of freedom surely *proves* that the causal principle is false.

There may be something in this; but to find and describe a moment of free choice turns out to be harder than you might think. For a start, we seem to spend quite a lot of each day on 'automatic pilot', going through well-rehearsed routines that do not involve much conscious thought. When, for example, the alarm goes off in the morning, I doubt if you consciously decide on each step of your morning routine – getting out of bed, getting in the shower, brushing your teeth, putting your clothes on, and so on. For it would simply be too exhausting if you had to agonise over each of these micro-decisions every day. I think a more accurate picture of what happens is that you simply get out of bed and initiate 'plan A' – your tried and tested routine for getting ready for school.

Nevertheless, our days are punctuated by various mundane decisions, such as what to wear or what to have for lunch. Let's go back to an earlier example, and take a closer look at your lunch-time choice between pizza and hamburger. How exactly does the choice get made? Well, if you are someone who loves pizzas and hates hamburgers, you do not really have a choice and you will take the pizza. So let us assume that you love pizzas and hamburgers and haven't had either of them for a long time. How do you decide which one to take? The strange thing is that there seems to be a kind of emptiness at the moment of decision. Do you make some kind of mental grunt and choose the pizza, or do you dither for a moment and then simply find yourself taking it? It is very difficult to say exactly what does happen. Things do not get any easier to describe when it comes to important decisions.

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1 Describe as accurately as you can what happens when you make a free decision, such as getting out of bed when the alarm goes off rather than snoozing for another twenty minutes.

2 How much of what you do every day would you say is determined by routine and habit, and how much by your conscious decisions?

3 When do you feel most free?
   - **a** When you fulfil your desires
   - **b** When you overcome your desires
   - **c** When, on a whim, you suddenly decide to do something
   - **d** When you do something creative
   - **e** Some other situation

Suppose you have a choice between two university offers and must decide which one to take. If university A ranks much higher than university B in terms of all your preferences, then there is again a sense in which you have no choice: you are bound to choose A. But what if it is finely balanced and you prefer A in some ways and B in others? If you still can't make up your mind after agonising over it and discussing it with your friends and family, you will probably 'sleep on it' and hope that the decision comes to you. So, once again, it seems that either the odds are stacked in favour of one particular option, in which case you are not really making a choice; or the two options are finely balanced, in which case it is very difficult to say just how you do make a choice.

Despite the difficulties involved in capturing and describing a freely chosen action, we do generally experience ourselves as active beings who are the authors of their actions. So, even if it is impossible to explain how free-will works, we surely cannot doubt that it exists.

Is the feeling of freedom an illusion?

However, a determinist is unlikely to be satisfied with this admission of ignorance. He may want to know exactly how a free decision affects what is going on in our brains. Does it somehow cause an atom or subatomic particle to swerve from its original course? If so, how can this be made consistent with the laws of physics? You might, once again, want to appeal to the uncertainty principle, but it is far from clear how this can help us to solve the problem.

Furthermore, it might be pointed out that just because you *feel* free doesn't mean that you *are* free – for the feeling could simply be an illusion. That, at least, is what the philosopher Baruch Spinoza (1632–77) thought: 'Men think themselves free because they are conscious of their actions, but ignorant of their causes.' If falling stones were conscious, said Spinoza, they would probably believe that they were falling of their own free-will. So perhaps we are simply puppets that are unaware of the strings of physical causation that are pulling us.

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1. If every morning someone delivered in a sealed envelope some precise predictions about what you would do during the day, and every evening you opened the envelope and found that they were all true, would this convince you that you did not have any free-will?
2. If the future is determined for the kinds of reasons that Laplace gave, but we are never in practice able to predict it, why, if at all, should we be worried?

At this point in our discussion, we seem to reach an impasse. If you are more convinced that the universe is orderly than that human beings have free-will, you are likely to insist that every event has a cause; and if you are more convinced that human beings have free-will than that the universe is orderly, you are likely to deny that every event has a cause.

Is free-will compatible with determinism?

One way of trying to get beyond the above impasse is to take the second of the options mentioned above and argue that free-will and determinism are compatible with one another. This view is known as **compatibilism** and it has proved popular with some philosophers.

Is freedom simply a matter of doing what you want?

While compatibilists believe that every event has a cause, they insist that this still leaves room for free-will. To be free, they say, is simply to be able to do what you want. And so long as you are not compelled or hindered by someone else, you are surely free. Such a common-sense view of freedom is quite consistent with determinism. Indeed, compatibilists argue that free-will is possible only to the extent that determinism is true. For, as we saw above, if your actions were uncaused they could not be said to be yours at all. This looks like a neat solution to the free-will problem which allows us to have our cake and eat it. For it seems to give us human free-will *and* an orderly and rule-governed universe.

1 If a dog does what it likes, can it be called free? How does its freedom differ from that of a human being?

2 To what extent do you think the free-will debate is simply an argument about the meaning of the word 'freedom'?

Can we control our desires?

The trouble with the compatibilist solution to the free-will problem is that it depends on a superficial analysis of the word 'freedom'. To see this, consider a smoker who feels like a cigarette and smokes one. Since he is doing what he wants without any external hindrance, a compatibilist would say that he is acting freely. But suppose our smoker is trying to quit smoking, and that when he desires a cigarette he has at the same time a higher-order desire *not* to desire a cigarette. Although at one level he is doing what he wants, at another level it is tempting to say that he is a *victim* of his desires. This description becomes more and more appropriate as we move up the scale of addictive habits. At the limit, I doubt that anyone would describe a heroin addict as free; and it might therefore be better to think of an addict as sick rather than criminal.

1 At what point on the road from non-addiction to addiction would you say that free-will ends and compulsion begins?

2 To what extent do you think we should hold drug addicts responsible for their behaviour?

In response to the above, you might point out that most of our desires are not in fact addictive, and that there is a clear difference between being in the grip of an addiction and making ordinary choices. While there may be some truth in this, the smoker example is not so easily dismissed. For it raises not only the question of where ordinary behaviour ends and addiction begins, but also the deeper question of the extent to which we are able to control or change our desires. Compatibilism says that you are free when you can do what you desire; but if your desires are themselves beyond your control, there would seem to be a deeper sense in which you are not free even when you are doing what you want.

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1 What distinguishes addictive behaviour from ordinary behaviour?

2 Which of the following might be described as addictive?

a Coffee
b Hamburgers
c Marijuana
d Work
e Shopping
f Love
g Crime
h Extreme sports

3 To what extent do you think we are able to change our desires? Could you, for example, decide to:

a like cheese, if you have always loathed it
b find someone interesting, if you have always found them boring
c work hard, if you have always been lazy
d show more concern for others, if you have always been selfish

To common sense, this talk of victimhood is at best misleading and at worst false. Such language may be appropriate to a smoker who is unable to quit, but the fact is that we are quite happy with many of our desires and have no wish to change them. If I enjoy listening to music and eating cheese and pickle sandwiches, why should I think of myself as a *victim* of these desires? 'Because' you are unable to change them, comes the response. The fact that you are happy with your desires does not mean you are free. A prisoner may be happy if he does not want to leave his cell, but he is still a prisoner.

But surely this talk of our being imprisoned by our desires is again misleading. For while a prisoner cannot decide to leave prison, we can – in some cases at least – change our desires. After all, some people quit smoking. This suggests that if you really want to give up smoking – or change yourself in some other way – then you can. Perhaps it is simply a matter of positive thinking, about which we hear so much in self-help manuals.

Could you have done otherwise?

This brings us to the heart of the matter. Any freedom worth having surely requires not simply that you can do what you want, but more radically that *you could do otherwise*. Let us go back to our smoker who wants to give up smoking and zoom in on a moment of temptation. He feels like a cigarette, briefly tries to resist, and then

gives in and reaches for the packet. Could he have resisted the temptation to have a cigarette? One response is to say that he could *if he had chosen to*. But that simply transforms the question into, 'Could he have chosen otherwise?' You might be tempted to say 'yes' on the grounds that if he had shown more will power then he could have chosen to resist. However, I think that determinism is committed to saying that if you replayed the videotape it would come out the same way every time. Admittedly, our smoker could have resisted temptation if he had shown more will power; but the point is that, being the kind of person that he was, in the situation that he was in, he just did not have the necessary self-control.

For a determinist, then, although your decisions may be determined by your character, your character itself has been determined by factors beyond your control. The upshot is that, given the kind of person that you are, you cannot help making the kinds of decisions that you do. Indeed, we sometimes excuse our behaviour by saying 'I can't help it – that's just the way I am.' And we are all aware how difficult it is to change aspects of ourselves that we dislike. Just think of those broken New Year resolutions!

? To what extent do you think you can change your character, and to what extent do you think you just have to live with it?

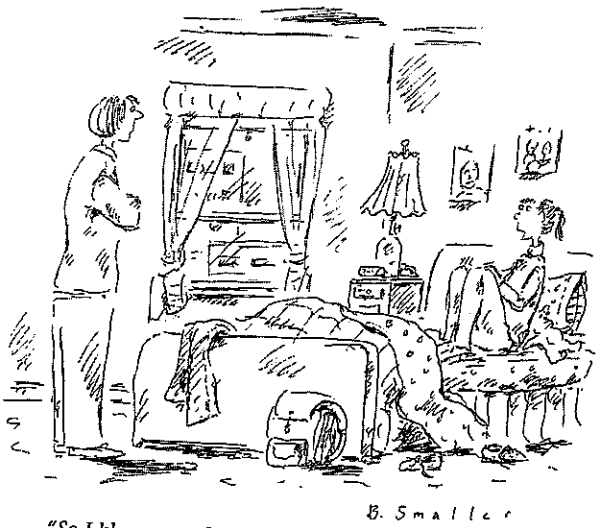
The upshot of our discussion would seem to be that determinism is incompatible with free-will in the sense that, although you can do what you want, you can never do otherwise than you do, and your wants and your will power are ultimately determined by factors beyond your control. This does not mean that determinism is true, but it does suggest that compatibilism is false. So in trying to solve the free-will problem, we seem to be back at square one.

Is free-will an illusion?

As a final approach to the free-will problem, we might take the bull by the horns and say that determinism is true and human free-will is an illusion. But this implies that there is no such thing as moral responsibility or rationality, and many people would say that this is too high a price to pay for accepting determinism.

Does determinism undermine ethics?

Some philosophers have argued that the implications of determinism for ethics are not in fact as serious as they look. Admittedly, we will have to abandon the idea that people deserve to be praised and blamed, or rewarded and punished for their actions. For, in a deterministic world, good people cannot help being good, and bad people cannot help being bad. Given this, you might think that we should close the courts and empty the prisons. After all, criminals are not responsible for the rotten genes and bad neighbourhoods that shaped their behaviour. However, a determinist would say that we are still justified in locking up criminals in order to: (1) protect society; and (2) modify their future behaviour. Without wishing to offend human dignity, we might make an analogy with the way we treat dogs. We do not hold dogs responsible



"So I blame you for everything—whose fault is that?"

Figure 9A.2

for their actions, but we still lock up mad dogs in order to protect people, and punish bad ones in order to reform them.

Here we have touched on two different theories of punishment: the **retribution theory**, which justifies punishing criminals on the grounds that they deserve it; and the **reform theory**, which justifies punishing them only if it will change their behaviour. While the former is retrospective and looks to the past, the latter is prospective and looks to the future. And while the former is inconsistent with determinism, the latter is perfectly consistent with it.

A determinist might argue that, even if we have free-will, the only civilised reason for punishing people – apart from protecting society – is to reform them. To punish someone if it is not going to improve their behaviour – merely 'because they deserve it' – smacks of vindictiveness. As critics of capital punishment say, executing someone for murder 'won't bring the victim back'. On this view, then, punishment is best seen as a form of education. And to punish for any reason other than reform (or protection) is itself a crime.

"Great news, Phil! The governor has determined that you don't have a high enough I.Q. to merit execution."

Figure 9A.3

1 Imagine a criminal contemplating a crime and thinking to himself: 'If I am caught, they will say that it's not my fault, that I couldn't help it. As a result, I will probably get off lightly. So I might as well do it.' Is this a good argument against the reform theory of punishment?

2 Do you think that punishment should be based more on reason, or emotion, or a combination of the two?

3 At what age would you say that a person becomes criminally responsible? Justify your view.

4 Do you think we should punish someone for a crime they committed fifty years ago? Does it depend on the nature of the crime? Give reasons for and against.

5 What is the difference between evil and insanity? Are mass murderers necessarily insane?

6 What difference do you think it would make if we thought of criminals as ill rather than bad, and spoke in terms of cure rather than punishment? Is this a better or worse way of looking at things?

7 To what extent do you think it is true that 'to know all is to forgive all'?

Despite its attractions, the reform theory of punishment is not without its critics. Two common objections to it are that it weakens the deterrence effect of punishment, and that it is hard to know where reform ends and brainwashing begins. More could be said about both of these points, and there are doubtless responses that could be made to them. However, we will not pursue this discussion further here. For, even if we allow that determinism is consistent with some forms of punishment, there is another, more serious, problem facing the theory.

Does determinism undermine rationality?

The problem I have in mind is that determinism does not seem to leave any room for the possibility of rationality. For reasoning implies that we are free to believe something or not to believe it; and it typically involves such things as weighing up evidence, considering implications, and making judgements. But if determinism is true, none of these factors plays any role in shaping our beliefs, which – like everything else – are determined by our characters and the surrounding environment. I, being the kind of person that I am, simply cannot help believing the kinds of things that I do; and you, being the kind of person that you are, cannot help believing the kinds of things that you do. It follows that trying rationally to prove that determinism is true is self-defeating in the same way that trying rationally to prove that you don't exist is self-defeating. In both cases, if the argument is convincing, then it undermines itself. What comes out of this is not that determinism is false, but that if it is true then you cannot rationally believe that it is true (or false) because in a deterministic world you cannot rationally believe anything.

More radically, one might argue that if determinism is true, then there is not even any room for language. For if we are not free to think about what we are saying and reflect on what we are hearing, then there would seem to be no difference between the talking of human beings and the singing of birds or the barking of dogs.

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1 To what extent do you think that people's beliefs are shaped by:
   a their characters
   b their environment?

2 Where do your thoughts come from? Does it make more sense to say that you think your thoughts or that your thoughts think you?

Conclusion

We have explored three ways of trying to resolve the conflict between our everyday belief that human beings have free-will and the scientific belief that we live in a law-governed and deterministic universe. But we have not been able to solve the problem. While there are some good arguments in favour of determinism, I think that in practice it would be almost impossible for us to abandon our belief in free-will. Some people take human free-will to show that we are fundamentally different from the rest of the natural world and have some kind of spiritual dimension. However, the free-will problem is as much of a problem for someone who believes in God as it is for an atheist. For, as we shall see in Chapter 13, if God is all-knowing, then He presumably knows our future as well as our past. And this, again, suggests that our future is in some sense already determined.

So there is, it seems, no easy way of avoiding the free-will problem. Perhaps the only conclusion we can draw from our discussion is that there are limits to knowledge and that some things lie beyond human understanding.